UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
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SUBJECT: Drake Superfund Site--Estimation of   **DATE:** 7/16/96
Emission Rates During "Routine"
Automatic Soil Feed Shutoffs

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One of the comments apparently raised in regard to EPA's
risk assessment of the Drake site incinerator concerns operations
during "off-normal" conditions that are not covered by the
process upset evaluation. It is not clear whether this is
intended to refer to "routine" operations that result in higher-
than-average emissions or whether it refers to automatic soil
feed shutoff events which fall short of the thermal relief valve
(TRV) openings that were modeled as the worst case process
upsets.

The response to the first scenario is very straightforward.
Emission estimates used in the revised risk assessment are not
"average" emission estimates, but rather "worst case" estimates
for the operating range allowed under the PADEP Air Quality
Equivalency Document.

The purpose of this memorandum is to explain my rationale
for concluding that modeled emission rates should not be affected
by automatic soil feed cutoff events that do not include a TRV
opening.

The conditions that would trigger this type of automatic
soil feed shutoff (ASFS) are listed beginning on page 3B-1 of the
Risk Assessment. Some of the parameters (e.g., dry ash conveyor
operation, kiln rotation speed) should not have any measurable
effect on incinerator performance (i.e., destruction and removal
of pollutant compounds). Since soil feed would be shut off, with
no decrease in performance, emissions would decline rapidly
following an ASFS triggered by one of these parameters.

Failure to operate within most of the listed parameters
(e.g., kiln pressure, afterburner temperature, stack flow rate,
etc.) could have a marginally detrimental effect on performance.

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However, the reduced performance would be more than offset by the elimination of additional feed compounds. This would again result in decreased emission rates.

Failure of both secondary combustion chamber burners is the only listed event that is predicted to have a significant effect on system performance. This would affect only nondioxin organic emissions. (The predicted effect, if any, on dioxin compounds would be to reduce their formation in the air pollution control equipment (APCE) by reducing the APCE temperature.) It is estimated that secondary burner failure would result in a 99.9% organic destruction and removal efficiency (DRE), creating a ten-fold increase over normal emissions.

The attached Table shows the predicted emission profile for the secondary burner failure scenario. It is characterized by an initial ten-fold increase over normal emissions, followed by an exponential decline to 1% of the original value after 25 minutes. This includes the combined effects of reduced DRE (99.9% over the entire period) and the soil feed shutoff. This incorporates the assumption, used in Section 2.4 of the Risk Assessment, that the vaporization of hazardous constituents declines to 1% of the original value 25 minutes after the soil feed shutoff.

Clearly, the short term effect of this event is less significant than the TRV opening that is modeled in the Risk Assessment. During the modeled TRV opening, DRE is predicted to drop to 99%, producing a 100-fold increase in most organic emissions. Metals and other inorganic emissions are also predicted to increase significantly. Therefore, the modeled TRV opening is a worst case estimate of acute exposures.

As shown in the attached Table, the long term effect of reduced DRE is predicted to be almost exactly offset by terminating the soil feed. The hourly average emission rate following the ASFS is predicted to be approximately the same as the rate for routine operations.

Based on this evaluation, ASFS's that do not include a TRV opening are predicted to have a negligible effect on hourly emission rates. It follows that they would not affect the long term risk estimates. Furthermore, the TRV opening that is modeled in the revised risk assessment represents a more severe acute exposure scenario. Hence, the TRV opening is the controlling acute exposure scenario.
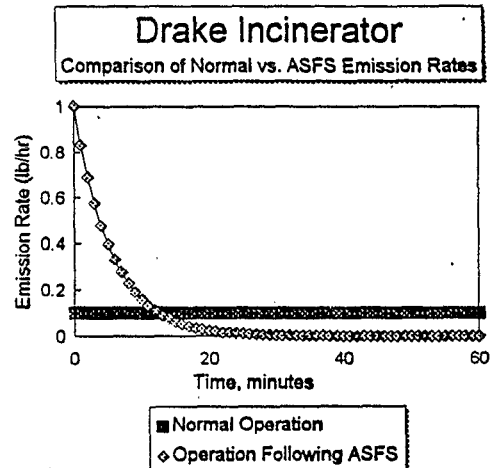
Attachment

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DRAKE SUPERFUND SITE
EMISSIONS FOLLOWING ASFS vs. NORMAL EMISSIONS

TIME	NORMAL OPERATION		OPERATION WITH ASFS	
	VOL. RATE	EMISSION RATE	VOL. RATE	EMISSION RATE
0	1000	0.1000	1000	1.0000
1	1000	0.1000	832	0.8318
2	1000	0.1000	692	0.6918
3	1000	0.1000	575	0.5755
4	1000	0.1000	479	0.4786
5	1000	0.1000	398	0.3981
6	1000	0.1000	331	0.3311
7	1000	0.1000	275	0.2754
8	1000	0.1000	229	0.2291
9	1000	0.1000	191	0.1906
10	1000	0.1000	159	0.1585
11	1000	0.1000	132	0.1318
12	1000	0.1000	110	0.1097
13	1000	0.1000	91	0.0912
14	1000	0.1000	76	0.0759
15	1000	0.1000	63	0.0631
16	1000	0.1000	52	0.0525
17	1000	0.1000	44	0.0437
18	1000	0.1000	36	0.0363
19	1000	0.1000	30	0.0302
20	1000	0.1000	25	0.0251
21	1000	0.1000	21	0.0209
22	1000	0.1000	17	0.0174
23	1000	0.1000	14	0.0145
24	1000	0.1000	12	0.0120
25	1000	0.1000	10	0.0100
26	1000	0.1000	8	0.0083
27	1000	0.1000	7	0.0069
28	1000	0.1000	6	0.0058
29	1000	0.1000	5	0.0048
30	1000	0.1000	4	0.0040
31	1000	0.1000	3	0.0033
32	1000	0.1000	3	0.0028
33	1000	0.1000	2	0.0023
34	1000	0.1000	2	0.0019
35	1000	0.1000	2	0.0016
36	1000	0.1000	1	0.0013
37	1000	0.1000	1	0.0011
38	1000	0.1000	1	0.0009
39	1000	0.1000	1	0.0008
40	1000	0.1000	1	0.0006
41	1000	0.1000	1	0.0005
42	1000	0.1000	0	0.0004
43	1000	0.1000	0	0.0004
44	1000	0.1000	0	0.0003
45	1000	0.1000	0	0.0003
46	1000	0.1000	0	0.0002
47	1000	0.1000	0	0.0002
48	1000	0.1000	0	0.0001
49	1000	0.1000	0	0.0001
50	1000	0.1000	0	0.0001
51	1000	0.1000	0	0.0001
52	1000	0.1000	0	0.0001
53	1000	0.1000	0	0.0001
54	1000	0.1000	0	0.0000
55	1000	0.1000	0	0.0000
56	1000	0.1000	0	0.0000
57	1000	0.1000	0	0.0000
58	1000	0.1000	0	0.0000
59	1000	0.1000	0	0.0000
60	1000	0.1000	0	0.0000
AVERAGE		0.1000		0.0974

For illustrative purposes only, the normal feed (i.e., volatilization) rate of organic constituents is assumed to be 1000 lb/hr. The emission rate during normal operations is calculated by applying a 99.99% DRE to the assumed feed rate (i.e., multiply the "Vol. Rate" by 0.0001).

Following failure of the secondary chamber burners, the automatic soil feed shutoff (ASFS) activates immediately. The organic volatilization rate is assumed to immediately begin to decline at an exponential rate, reaching 1% of the original rate after 25 minutes. The incinerator DRE is also assumed to decrease 10-fold to 99.9%. Thus, the emission rate is calculated by multiplying the volatilization rate by 0.001.

As shown at the bottom of the Table, the hourly average emission rates under both scenarios are, essentially, equal. Both scenarios are plotted graphically below.

Drake Incinerator
Comparison of Normal vs. ASFS Emission Rates

Emission Rate (lb/hr) vs. Time, minutes

■ Normal Operation
◇ Operation Following ASFS